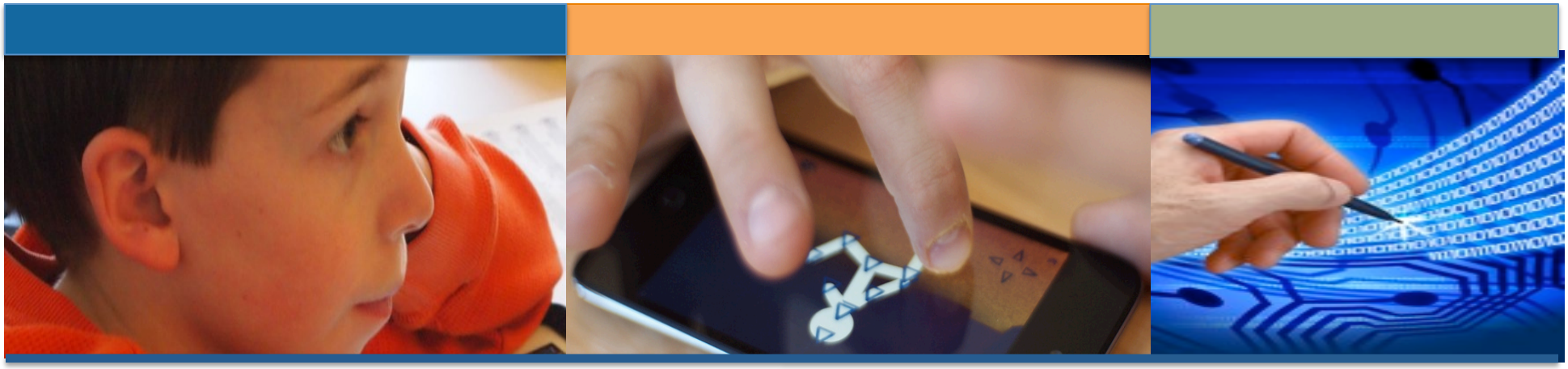


Toward an Evidence Framework for Evaluating Online Learning

Barbara Means
SRI International

Russell Rumberger
UC Santa Barbara

The work described in this presentation was supported by the Office of Educational Technology, U.S. Department of Education through contract ED 04-CO-0040 with SRI International.

Evidence Framework Report

- Effort of the Office of Educational Technology of the U.S. Department of Education
- Explains why the transition to digital learning warrants rethinking educational evidence
- Describes new approaches to evidence gathering
- Explains how the newer approaches can be applied to:
  - Developing effective digital learning resources
  - Dynamically adapting learning to individual students
  - Supporting students' learning and well-being in and out of school
  - Measuring hard-to-assess learner competencies
  - Finding digital learning resources that will meet a practitioner's needs and preferences
- Presents a Decision Model providing general guidance with respect to the strength of evidence needed for different kinds of learning technology decisions
- Recommends actions for policymakers, practitioners, developers and researchers

Learning Technology Evidence Framework Technical Working Group

Eva Baker, UCLA	Jim Pellegrino, University of Illinois at Chicago
Allan Collins, Northwestern University	William Penuel, University of Colorado
Chris Dede, Harvard University	Zoran Popovic, University of Washington
Adam Gamoran, University of Wisconsin - Madison	Steve Ritter, Carnegie Learning
Kenji Hakuta, Stanford University	Russ Rumberger. University of California, Santa Barbara
Ken Koedinger, Carnegie Mellon University	Mike Smith, Carnegie Foundation for the Advancement of Teaching
David Neimi, Kaplan Inc.	Phoenix Wang, William Penn Foundation

Implications of the Shift to Digital Learning for the Nature of Evidence

- The *development* of digital learning resources for K-12 students is exploding.
- The K-12 *use* of digital learning resources is also rising very quickly.
- But the *study* of digital learning resources has not kept pace.
- We are just *beginning to understand* all the things we can do with the data generated by digital learning systems.

Goals of the Evidence Framework

- Getting information on the use and outcomes of new learning technologies much more quickly
- Implementing continuous improvement processes leveraging the data from learning technologies so education can get better over time
- Evidence-supported decision-making that takes into account the range of factors people care about

Six Emerging Sources of Evidence

- Data mining and learning analytics applied to data from massively implemented learning systems
- Rapid A/B testing within online systems
- Design-based implementation research
- Meta-data from users accessing web-based digital resources
- Technology-supported evidence-centered design
- Sharing data sets across projects; linking individual-level data across agencies

Some Key Ideas from the Report - 1

How can we make sure that a technology-based intervention is effective in filling the goals we set for it?

- Effectiveness is not a trait inherent in a technology or intervention per se.
- Ideally, learning resources and their implementation would be continually refined in a process with feedback loops. *(Design-based implementation research)*
- Internet distribution of digital learning resources and the data generated when users access and use those resources permit quick and efficient generation of evidence at scale. *(A/B testing; data mining)*
- But there are limits to what can be learned by looking solely at system data—most notably, the extent to which learner performance with the system predicts performance in other tasks and settings.

Some Key Ideas from the Report - 2

What can we do with data collected from digital learning systems?

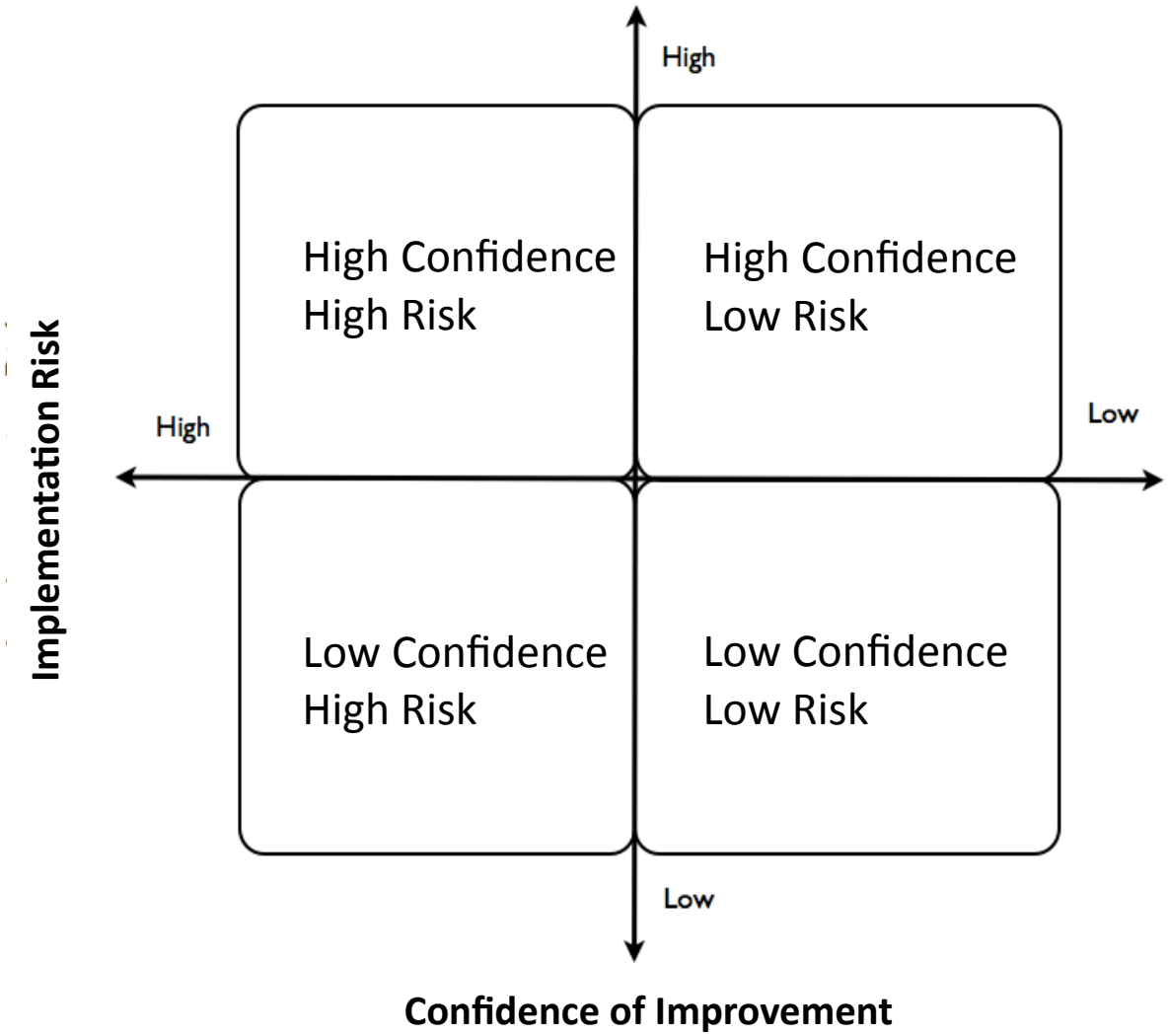
- Measures such as response latency, the amount of scaffolding needed, choice of problem or solution path, and response to feedback can be used to better understand an individual student's learning. *(Evidence-centered design)*
- Collecting tens of thousands of data points per learner per day, sophisticated digital learning systems can continuously offer a student approaches that have worked for other, similar learners.
- The large amounts of micro-level data generated by learning systems can lead to new insights about the variability and constancies of learning.
- New-generation student data systems are starting to track a wider range of student information. Administrative data are being linked with data from learning management systems. *(Linked data systems)*
- Predictive models can be developed from these data and used in "early warning systems" that provide timely feedback to both students and educators.

Some Key Ideas from the Report - 3

How can we help educators find reliable sources of evidence about digital learning resources and use it to make their decisions?

- Internet-distribution enables users to modify, create, share, and review learning resources themselves.
- Users consider multiple aspects of a product -- including its design process; endorsements; alignment to standards; fit for their context; and ease of use; as well as evidence of effectiveness.
- Online repositories and communities are helping instructors select and combine digital learning resources. They are making ratings and reviews by users and experts, user panels, and test beds widely available. *(Meta-data from users)*
- Data mining can be used to make recommendations of digital learning resources that similar users have downloaded and rated highly.

Evidence Decision-Making Model



Parting Thoughts

- We have the technical capability to collect unprecedented quantities of micro-learning data within online learning systems.
- These data can help us assess student learning and course behavior when there is still time for corrective action,
- AND these data can be used in a continuous improvement process to make the learning system better and better.
- BUT we still need to demonstrate that online learning systems with high implementation risk (because of scale, cost, stakes or implementation complexity) produce learning outcomes at least as good as those of conventional instruction,
- AND we can get smarter about how to design and implement digital learning if we study it systematically.

Watch for public release at http://evidenceframework.org/

Thank You

Headquarters: Silicon Valley

SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025-3493
650.859.2000

Washington, D.C.

SRI International
1100 Wilson Blvd., Suite 2800
Arlington, VA 22209-3915
703.524.2053

Princeton, New Jersey

SRI International Sarnoff
201 Washington Road
Princeton, NJ 08540
609.734.2553

Additional U.S. and international locations

www.sri.com